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Data Sources and Methods: Protected Areas Indicators

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Canada

Introduction

CESI reports the protected areas indicators as a measure of human response to the loss of biodiversity and natural habitat. As the amount of protected area in Canada increases, more natural landscapes are withdrawn from direct human development stresses, thereby preserving ecosystem services and contributing to biodiversity conservation. While the results can be linked to International Union for the Conservation of Nature (IUCN) standards for management goals, the degree to which the areas are ecologically intact and protected from the combined impact of human activities is not known. The Canadian Council on Ecological Areas (CCEA) compiles information on protected areas in Canada to support national and international reporting.

The CCEA uses the international definition of a protected area as "a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values".[1] Land and/or water access, use and activities are legally restricted – permanently or temporarily – primarily for the purpose of conserving biodiversity and ecosystem function, regardless of proprietary designation (e.g., park, conservation area, wildlife reserve).

How the indicator was derived

Federal, provincial and territorial departments and agencies, as well as the Nature Conservancy of Canada, have submitted geospatial and ancillary data for protected areas under their administrative control to the Canadian Council on Ecological Areas (CCEA). These data contributors will be referred to here as jurisdictions. Data on areas controlled by other non-governmental organizations are also included in cases where a jurisdiction has accepted responsibility for data stewardship. These data are housed in the Conservation Areas Reporting and Tracking System (CARTS) and are used here with the exception of Quebec data. Data for Quebec are housed in the Registry of Protected Areas database at the Ministère du Développement Durable, de l'Environnement et des Parcs (MDDEP) and were acquired directly from the ministry for this analysis.

Data submitted include the name of the protected area, its geospatial location, boundaries (when available), official area (ha), biome (terrestrial/marine), managing jurisdiction, and protection date, among other information.

In cases where the same information does not apply to the entire protected area, it is divided into zones for reporting. For example, a single protected area that crosses a provincial border is divided into zones corresponding to the different provinces. Similarly, a protected area that is later expanded will be treated as several zones, each with their own protection dates. For all protected areas, terrestrial and marine areas are treated as separate zones. Ancillary data is maintained independently for each zone. Protected areas that are undivided are treated as a single zone.

Canada's Protected Areas indicator

The official area of all terrestrial zones in both databases were summed and divided by the total terrestrial area of Canada. Terrestrial areas include both land and freshwater bodies. Other reports consider different divisions of terrestrial and marine areas and consequently will report somewhat different figures.

The official area of all marine zones in the databases were summed and divided by the total area of Canada's ocean estate (includes the territorial sea, exclusive economic zone and the continental shelf if more than 200nm from the seaward edge of the territorial sea).

To generate trend information, an estimate was made of the total protected area in each year since 1990. For each biome and using the reported protection date, the official area was summed for all zones with a protection date in the year of interest or earlier (*i.e.* for 1990, this is the total official

[1] Dudley, N. (2008) Guidelines for Applying Protected Area Management Categories (http://data.iucn.org/dbtw-wpd/edocs/PAPS-016.pdf), IUCN: Gland, Switzerland, page 6.

area of all zones with a protection date of 1990 or earlier). Overlaps cannot currently be accounted for. Zones with an unknown protection date (4.4% of total protected area) were assigned to pre-1990.

Rates of change were calculated by dividing the difference in area (later minus earlier) by the total area protected in the earlier year. Areas with an unknown protection date were excluded from this calculation.

In keeping with general practice, protected areas assigned to IUCN categories IA, IB, II, III or IV were considered to be "strictly protected". See the Canadian Guidebook for the Application of IUCN Protected Areas Categories, 2008 (http://www.ccea.org/en_order.html), for details on the application of international standards in Canada.

Protected Areas, by Province and Territory

CARTS contains information on the province or territory into which a protected area falls. For each province except Quebec, the official area of all terrestrial zones in that province were summed and divided by the total terrestrial area of the province. Territories were treated in the same way.

For Quebec, the total terrestrial protected area was provided by MDDEP and divided by the official terrestrial area of Quebec, also provided by MDDEP. Note that MDDEP undertakes an analysis which corrects for overlaps (*e.g.* areas managed by multiple jurisdictions that would otherwise be counted twice).

Because overlaps can be accounted for in Quebec but not elsewhere, the national indicator for 2010 varies from the sum of the regions.

Protected Areas, by Ecozone+

CESI has used the Ecozones+ framework developed for the Ecosystem Status and Trends 2010 report because it updates the *National Ecological Framework for Canada* ecozones to reflect new information, adds marine units, and includes the Great Lakes. This modified classification system is referred to as "ecozones+" to avoid confusion with the more familiar "ecozones" of the original framework

The CARTS and MDDEP databases do not contain information on ecozones. To generate an estimate of protected area within each ecological region, a geospatial analysis with the Ecozones+ framework was made:

1. For each database, the polygon area of each zone was calculated (this is distinct from the official area, as polygon boundaries are approximate).
2. Zones were intersected with ecozone+ boundaries in such a way as to divide protected area zones into subzones based on the ecozones+.
3. The proportional areas of the subzones relative the original polygon were calculated (*i.e.* each zone was divided into subzones such that the sum of the subzone proportional areas was 1).
4. The official area of each zone was allocated to its subzones based on the proportional area.
5. The allocated official area was summed for each ecozone+.
6. For Quebec, the area of overlap was calculated and subtracted to bring the total ha protected closer to the official total (1% error was reduced to 0.04% error).
7. Totals for each ecozone+ were summed across the two databases.

In other words, a hypothetical protected area with an official area of 100 ha and a polygon boundary that fell 60% into the Taiga Shield and 40% into the Boreal Shield would be divided into subzones of 60 ha and 40 ha in the respective zones.

With the exception of the Great Lakes ecozone+, the total area of each ecozone+ was calculated from their geospatial boundaries. For the Great Lakes, the area bounded by terrestrial ecozones+ to the north and the Canadian-American border to the south was calculated.

The total area protected per ecozone+ was divided by the total area of the ecozone+ to generate a percentage protected.

Data sources

Protected areas:

For Canada except Quebec: Canadian Council on Ecological Areas (CCEA) (2010) Conservation Areas Reporting and Tracking System (CARTS). Retrieved 10 October, 2010. Available from: http://www.ccea.org/en_carts.html.

For Quebec: Ministère du Développement durable, de l'Environnement et des Parcs (2010) Base de données du Registre des aires protégées au Québec (in French only). Retrieved 16 December, 2010. Available from: http://www.mddep.gouv.qc.ca/biodiversite/aires_protegees/registre/index.htm#synthese.

Provincial and territorial areas:

For Canada except Quebec: Natural Resources Canada (2009) The Atlas of Canada: land and Freshwater Areas (http://atlas.nrcan.gc.ca/site/english/learningresources/facts/surfareas.html/), Canada Centre for Remote Sensing. Areas are estimated using the Atlas of Canada 1:1 000 000 scale hydrography base.
For Quebec: Ministère du Développement durable, de l'Environnement et des Parcs.

Marine area:

Fisheries and Oceans Canada (2010) Canada's Ocean Estate: A description of Canada's maritime zones (http://www.dfo-mpo.gc.ca/oceans/canadasoceans-oceansducanada/marinezones-zonesmarines-eng.htm)

Ecozones+:

Federal, Provincial and Territorial Governments of Canada (2010) Canadian Biodiversity: Ecosystem Status and Trends 2010. Available from: http://www.biodivcanada.ca/ecosystems.

National boundaries:

Government of Canada (2008) Atlas of Canada 1,000,000 National Frameworks Data, Administrative Boundaries. Available from: http://www.geogratis.gc.ca/download/frameworkdata/boundaries/.

Caveats and limitations

Responsibility for source data accuracy and completeness lies with the jurisdictions. The CCEA provides data standards and guidance including a procedures manual. The reported official area is generally more reliable than the boundary data and has therefore been used for analysis whenever possible. No account has been taken of overlaps, with the exception of the Quebec protected area and ecozone+ analysis. Areas that are no longer protected are not captured in the trend analysis.

Spatial coverage

National.

Temporal coverage

Each protected area has a recorded date of protection. Sites with an unknown protection date are either treated as pre-1990 or removed from consideration, depending on the analysis. Protection dates continue to be incorporated into the database.

The CARTS data is from 10 October 2010. The MDDEP data is from 16 December 2010. Temporal coverage is 1876 to 2010.

Data quality completeness

The data include all areas under the direct administrative control of each jurisdiction (federal, provincial, territorial or non-government organization). Some private lands, areas preserved by environmental non-government organizations (ENGOs), municipal and other conservation areas are not included. Data on additional non-government areas will be included in the future as jurisdictions assume the responsibility of providing it to the CCEA.

Data quality timeliness

Protected areas information provided by the CCEA is kept current. CARTS data for this report were updated 10 October 2010, and were the most recent available as of 31 December 2010. MDDEP data for this report were updated 16 December 2010, and were the most recent available as of 31 December 2010.

For more information

Canadian Council on Ecological Areas (http://www.ccea.org/)

MDDEP Protected Areas (http://www.mddep.gouv.qc.ca/biodiversite/aires_protegees/index-en.htm)